

## **REMARKS**

### **I. General**

Claims 1-29 were pending in the present application, and all of the pending claims are rejected in the current Office Action (mailed July 27, 2006). The outstanding issues raised in the current Office Action are:

- Claim 12 is rejected under 35 U.S.C. § 112, second paragraph as lacking antecedent basis for certain terms; and
- Claims 1-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,775,692 issued to Albert et al (hereinafter “*Albert*”) in view of U.S. Patent No. 5,774,660 issued to Brendel et al. (hereinafter “*Brendel*”).

In response, Applicant respectfully traverses the outstanding claim rejections, and requests reconsideration and withdrawal thereof in light of the amendment and remarks presented herein.

### **II. Amendment**

Claim 12 is amended herein to correct a typographical error such that it depends from claim 11, rather than from claim 1. Claim 12 is also amended recite “an initial sequence number” rather than “said initial sequence number” to resolve lack of antecedent basis for this term.

### **III. Rejection Under 35 U.S.C. §112, Second Paragraph**

Claim 12 is rejected under 35 U.S.C. § 112, second paragraph as lacking antecedent basis for certain terms. Specifically, the Office Action asserts that claim 12 lacks antecedent basis for “said second BTCP module”, “said initial sequence number”, and “said second TCP module”, *see* page 2 of the Office Action.

As mentioned above, claim 12 is amended herein to correct the typographical error such that it depends from claim 11, rather than from claim 1. Applicant respectfully submits that when properly considered as depending from claim 11, proper antecedent basis is provided for the terms “said second BTCP module” and “said second TCP module”. Further, claim 12 is amended to recite “an initial sequence number” rather than “said initial sequence number”.

Therefore, this rejection of claim 12 should be withdrawn.

#### **IV. Rejections Under 35 U.S.C. §103(a) over *Albert* in view of *Brendel***

All of claims 1-29 were previously rejected in a Final Office Action mailed April 20, 2005 as being anticipated under 35 U.S.C. § 102(e) by *Albert*. In response, Applicant appealed the rejection to the Board and submitted an Appeal Brief presenting arguments regarding why the claims are not anticipated by *Albert*. In response to the Appeal Brief, the Examiner has reopened prosecution and now rejects the claims as being unpatentable over *Albert* in view of *Brendel*. Applicant respectfully submits that *Brendel* does not cure the deficiencies of *Albert* for the reasons discussed below. In particular, *Brendel* is discussed in the Background section of the present application (*see* page 4, line 10 – page 5, line 15 of the present application) and is noted as disclosing an inefficient mechanism for transferring TCP states that requires use of a proprietary protocol that is known only to the application level, which embodiments of the present invention overcome. Thus, for the reasons discussed further below, the combination of *Brendel* with *Albert* fails to render the claims unpatentable. As such, Applicant respectfully requests that the rejections be withdrawn and this application be passed to allowance.

To establish a *prima facie* case of obviousness, three basic criteria must be met. *See* M.P.E.P. § 2143. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the applied references must teach or suggest all the claim limitations. Without conceding any other criteria, the applied references fail to teach or suggest all elements of the claims.

Independent Claim 1

Independent claim 1 recites:

In a communication network, a method of TCP state migration comprising the steps of:

- a) establishing a communication session between a client and a front-end node at a first bottom TCP (BTCP) module located below a first TCP module in a first operating system at said front-end node, said front-end node accessing a plurality of back-end web servers forming a web server cluster that contains content;
- b) receiving a HTTP request from said client at said first BTCP module;
- c) parsing said HTTP request to determine which back-end web server, a selected back-end web server, in said plurality of back-end web servers can process said HTTP request, said selected back-end web server not said front-end node;
- d) extending said communication session to said selected back-end web server by handing-off an initial TCP state of said first BTCP module to said selected back-end web server;
- e) sending said HTTP request to said selected back-end web server;
- f) switching a bottom IP (BIP) module at said front-end node to a forwarding mode, wherein packets received at said BIP module from said client are forwarded to said selected back-end web server, said BIP module located below an IP module at said front-end node; and
- g) terminating said communication session at said front-end node after said HTTP request is fully processed.

The combination of *Albert* and *Brendel* fails to teach or suggest all elements of independent claim 1. For the reasons discussed further in the Appeal Brief of January 5, 2006, *Albert* fails to disclose at least:

- A) a first bottom TCP (BTCP) module located below a first TCP module in a first operating system at a front-end node;
- B) parsing an HTTP request to determine which back-end web server can process the HTTP request;
- C) a bottom IP (BIP) module located below an IP module at the front-end node; and
- D) handing-off an initial TCP state of said first BTCP module to said selected back-end web server.

The current Office Action appears to concede that *Albert* fails to teach or suggest these elements, *see* page 4 of the Office Action. However, the Office Action asserts that *Brendel* discloses these elements of the claim. Applicant respectfully disagrees, as discussed below.

The present application briefly discusses *Brendel* at page 4, line 10 – page 5, line 15 as follows:

Another solution for request distribution is illustrated by the Brendel et al patent (U.S. 5,774,660) by Resonate, Inc. In Brendel et al., a load balancer examines the content of the web request to provide for better efficiency in processing requests. However, the Brendel et al. patent platform weaves a proprietary protocol within the TCP/IP protocol of an operating system of the load balancer. As a result, the algorithm utilized by the Brendel et al. patent necessitate kernel source modifications when porting from one operating system to another.

Also, in the Brendel et al. patent the proprietary protocol is applied at the application layer of the operating system of the load balancer. Incoming packets to the load balancer have their protocol changed from TCP to a non-TCP (IXP) standard that is only understood by the proprietary protocol located at the application layer. Later, the packets have their packets changed back to the TCP protocol for transmission to the back-end servers. Thus, the Brendel et al. patent reduces processing efficiency by switching back and forth between user level kernels.. Further, were the Brendel et al. patent to be implemented at the operating system's kernel level, any modifications made to the proprietary protocol would necessarily require access to the kernel source file which typically is not available.

Thus, a need exists for more flexibility in designing and implementing a TCP/IP handoff mechanism in a web server cluster. Another need exists for a TCP/IP handoff mechanism that is more portable between different operating systems implementing the TCP/IP protocol. Still another need exists for better efficiency in performing TCP/IP handoff mechanisms.

Thus, the present application expressly recognized that *Brendel* fails to provide modules within an operating system, such as those recited above in claim 1. For instance, *Brendel* does not teach or suggest “handing-off an initial TCP state of said first BTCP module to said selected back-end web server”. No such BTCP module is implemented in the operating system of *Brendel*. Instead, *Brendel* requires that incoming packets be changed into a proprietary protocol

that is understood only at the application layer. For instance, *Brendel* explains at col. 13, lines 40-46 thereof:

Modified TCP/IP stack 82 contains the standard TCP and IP modules with some modifications explained later. One modification is that incoming packets from the Internet have their protocol changed from TCP to a proprietary “IXP” protocol. Since this IXP protocol is unknown to the standard TCP and IP layers, it is sent directly up to application layer 80 containing the load balancer.

Thus, *Brendel* appears to disclose a system in which the TCP/IP stack of an operating system is modified so as to change incoming packets from the TCP protocol to a proprietary protocol that is understood only at the application layer, rather than implementing modules, such as a BTCP module within the operating system, as recited by claim 1.

Thus, for at least the above reasons, the combination of *Albert* and *Brendel* fails to teach or suggest all elements of claim 1. As such, the rejection of claim 1 should be withdrawn, and claim 1 should be passed to allowance.

#### Independent Claim 11

Independent claim 11 recites:

In a communication network, a method of TCP state migration comprising the steps of:

- a) receiving a request from a client for establishing a communication session at a first bottom TCP (BTCP) module located at a front-end node, said front-end node accessing a plurality of back-end web servers containing content, wherein said content is partially replicated between each of said plurality of back-end web servers, said communication session established for the transfer of data contained within said content to said client;
- b) establishing said communication session between said client and said first BTCP module, said first BTCP module located below a first TCP module in a first operating system at said front-end node;
- c) receiving a HTTP request from said client at said first BTCP module;
- d) parsing said HTTP request to determine which back-end web server, a selected back-end web server, in said plurality of back-end web servers

contains said data in order to process said HTTP request, said selected back-end web server not said front-end node;

e) extending said communication session to said selected back-end web server by handing-off an initial TCP state of said first BTCP module to a second BTCP module located at said selected back-end web server, said initial TCP state associated with said communication session between said client and said first BTCP module, said second BTCP module located below a second TCP module in a second operating system at said selected back-end web server;

f) sending said HTTP request to said selected back-end web server;

g) switching a bottom IP (BIP) module in said front-end node to a forwarding mode, wherein packets, from said client, received at said front-end node are intercepted by said BIP module and forwarded to said selected back-end web server, said BIP module located below an IP module in said front-end node, said BIP module changing destination IP addresses of said packets to said selected back-end web server and

h) terminating said communication session after said HTTP request has been fully processed.

The combination of *Albert* and *Brendel* fails to teach or suggest all elements of independent claim 11. For the reasons discussed further in the Appeal Brief of January 5, 2006, *Albert* fails to disclose at least:

A) a first BTCP module located below a first TCP module in a first operating system at a front-end node;

B) parsing an HTTP request to determine which back-end web server contains data in order to process the HTTP request;

C) a bottom IP (BIP) module located below an IP module in the front-end node;

D) handing-off an initial TCP state of said first BTCP module to a second BTCP module located at said selected back-end web server; and

E) a second BTCP module located below a second TCP module in a second operating system at said selected back-end web server.

Further, *Brendel* fails to teach or suggest at least first and second BTCP modules, and handing-off an initial TCP state of the first BTCP module to the second BTCP module, as recited by claim 11. For instance, as discussed above with claim 1, *Brendel* does not teach or suggest any such BTCP modules, but instead appears to disclose a modified TCP/IP stack that changes

an incoming packet's protocol to a proprietary protocol that is unknown to the TCP/IP stack for handling at the application level.

Thus, for at least the above reasons, the combination of *Albert* and *Brendel* fails to teach or suggest all elements of claim 11. As such, the rejection of claim 11 should be withdrawn, and claim 11 should be passed to allowance.

#### Independent Claim 22

Independent claim 22 recites:

A communication network for TCP state migration comprising:  
a client;  
a front-end node coupled to said client by said communication network,  
said front-end node including a front-end bottom TCP (BTCP) module located  
below a front-end TCP module in a first operating system, and a bottom IP (BIP)  
module located below an IP module in said first operating system; and  
a plurality of back-end web servers including a selected back-end web  
server, said plurality of back-end web servers containing content that is  
partitioned between each of said plurality of back-end web servers, each of said  
plurality of back-end web servers coupled to said front-end node through said  
communication network, each of said plurality of back-end web servers including  
a back-end bottom TCP module located below a back-end TCP module.

The combination of *Albert* and *Brendel* fails to teach or suggest all elements of independent claim 22. For the reasons discussed further in the Appeal Brief of January 5, 2006, *Albert* fails to disclose at least:

- A) a front-end node that includes a front-end bottom TCP (BTCP) module located below a front-end TCP module in a first operating system;
- B) a front-end node that further includes a bottom IP (BIP) module located below an IP module in said first operating system; and
- C) a back-end web server that includes a back-end bottom TCP module located below a back-end TCP module.

Further, *Brendel* fails to teach or suggest at least the BTCP and BIP modules, as recited by claim 22. For instance, as discussed above with claim 1, *Brendel* does not teach or suggest any such BTCP modules, but instead appears to disclose a modified TCP/IP stack that changes an incoming packet's protocol to a proprietary protocol that is unknown to the TCP/IP stack for handling at the application level.

Thus, for at least the above reasons, the combination of *Albert* and *Brendel* fails to teach or suggest all elements of claim 22. As such, the rejection of claim 22 should be withdrawn, and claim 22 should be passed to allowance.

#### Dependent Claims

In view of the above, Applicant respectfully submits that independent claims 1, 11, and 22 are not unpatentable under 35 U.S.C. § 103 over *Albert* in view of *Brendel*. Further, each of dependent claims 2-10, 12-21, and 23-29 depend either directly or indirectly from one of independent claims 1, 11, and 22, and thus inherit all limitations of the respective independent claim from which they depend. It is respectfully submitted that dependent claims 2-10, 12-21, and 23-29 are allowable not only because of their dependency from their respective independent claims for the reasons discussed above, but also in view of their novel claim features (which both narrow the scope of the particular claims and compel a broader interpretation of the respective base claim from which they depend).



## V. Conclusion

In view of the above, Applicant believes the pending application is in condition for allowance. Applicant believes no fee is due with this response. However, if a fee is due, please charge Deposit Account No. 08-2025, under Order No. 10012351-1 from which the undersigned is authorized to draw.

I hereby certify that this document is being transmitted to the Patent and Trademark Office via electronic filing.

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Respectfully submitted,

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